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भारतीय मानक

जीवन चक्र लागत

भाग 1 पारिभाषिक शब्दावली

Indian Standard

LIFE CYCLE COSTING

PART 1 TERMINOLOGY

UDC 657·471·1 : 001·4

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAZAR MARG
NEW DELHI 110002

September 1991 **Price Group 3**

Management and Productivity Sectional Committee, BSD 3

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards. after the draft finalized by the Management and Productivity Sectional Committee, had been approved by the Basic Standards, Systems and Services Division Council.

With ever increasing investments both by industry and Government, together with the manifold complications of the continuous explosion in technology, considerable inflation in cost of materials, labour, energy, etc, and the changing international and national environments, decisions based on initial costs alone have often proved to be counter-productive and uneconomical. In particular, where public money is involved, it becomes necessary to ensure the maximum benefits out of every investment. In this situation, a systematic methodology for assessing the total cost of an asset or proposed investment over its entire operating life, and in particular, to equitably compare various choices open to the decision making authority, becomes essential.

Life cycle costing (LCC) is a method to arrive at such an economic and equitable assessment of competing design alternatives. It takes into account every significant element of cost over the total ownership period of the asset and works out its total costs over its entire operating life, expressed in monetary units applicable to a given base date. Given equal levels of performance, the LCC comparison will then itself enable decisions being made. Where levels of performance vary, the LCC can be related to specific units of performance in such a way as to enable optimum decisions.

Part 2 of this standard (*under preparation*) would cover the life cycle costing basics, procedures, techniques and examples to enable actual real-life applicability.

For convenience, the terminology has been arranged in the alphabetical sequence.

Indian Standard
LIFE CYCLE COSTING
PART 1 TERMINOLOGY

1 SCOPE

This standard (Part 1) defines the terms used in Life cycle costing (LCC).

2 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

2.1 Alteration Costs

Anticipated costs of modernization or changes to the facility or asset in order to provide for changed requirements.

2.2 Amortization

The process of converting the initial capital cost and one time future costs to annual figures incurred over the life of the asset, thus enabling that initial or one time cost together with interest due thereon to be wiped out in full.

2.3 Amortization Factor

The multiplying number or decimal used to convert the initial cost or one-time costs into amortized payments necessary to pay off that initial costs/debt/investment or one time amount together with any interest due thereon, over the desired period, usually the life of the asset.

2.4 Analysis, Future Value

Present value analysis (*see* **2.6**) except that the cost will relate to a future point in time.

2.5 Analysis, Life Cycle Cost

The comparison of acceptable alternatives on the basis of their contribution of life cycle costs using present value or annualized cost methodology.

2.6 Analysis, Present Value

An economic technique to discount cost occurring in future years to their equivalent current value and sum them taking into consideration the effects of inflation or deflation as well as the earning potential of money over a given period.

2.7 Annual Value

The money value worked out as per the cost annualized method (*see* **2.8**).

2.8 Annualized Method

A technique that enables conversion of all present and future incomes or expenditures to a recurring annual figure based on the same, uniform desired life.

2.9 Annual Recurring Costs

The costs that are incurred on a regular pattern each year throughout the life under study.

2.10 Annuity

A series of equal payments or receipts to be paid or received at the end of successive periods of equal time.

2.11 Associated Costs

These costs may include: safety, security, insurance, utilities (other than energy), waste disposal and any other costs not specifically defined elsewhere in this standard.

2.12 Baseline

The common point in time against which all costs or benefits from investment opportunities are measured; this is usually the commissioning date, also referred to as the base date.

2.13 Break-Even Point

The operating level or financial level at which income of a company or facility just cover all fixed and variable costs. Depreciation is normally included. Profits start accruing only after the break-even point.

2.14 Capital, Cost of

See Financing Cost, (**2.42**).

2.15 Capital, Fixed

The investment in an asset. It may represent real estate, equipment, buildings, furniture and fixtures, transportation equipment used directly in the production of a product or service, etc. It includes all the costs incidental to getting the facility in place and in operating condition including legal patents, licenses, installation and start-up expenses.

2.16 Capital, Working

Capital in current use in the operation of a business; the excess of current assets over current liabilities; net current assets.

2.17 Capitalized, Cost

The present worth of the cost incurred annually such as for operating and maintaining on asset.

2.18 Cash Flow

The net flow of money into or out of the proposed project. It is the algebraic sum in any time period, of all cash receipts, expenses, and investments.

2.19 Construction Cost

A general term used to describe either the total cost associated with the construction of an asset or the costs incurred at the construction site. It is the sum of all costs, direct and indirect, inherent in converting a design into a commissioned project ready for operation, that is sum of field labour, supervision, adminstration, tools, field office expense and field purchased material costs, engineering, installation and commissioning, etc.

2.20 Cost Control

The application of systematic procedures to monitor the progress of projects, manufacturing operations and/or service functions in order to minimize cost with the objective of increasing profitability while continuously assuring efficient operations.

2.21 Cost, Differential

The difference in the life cycle cost between two competing alternatives.

2.22 Cost, Investment

See Investment (**2.50**).

2.23 Cost Life Cycle

See **2.52**.

2.24 Cost, Lowest Total

The lowest life cycle cost.

2.25 Cost Total

Sum of all costs incurred to acquire, use, maintain, and finally dispose of a product or service including the time and effort of buying (*see also* **2.52**).

2.26 Cost, Variance

The difference between the budgeted or standard cost and the actual cost incurred.

2.27 Depreciation

A method that distributes the monetary value (less salvage value) of a tangible asset over the estimated years of productive or useful life. It is a process of allocation, not valuation and intended to fund the replacement of the used-up asset.

2.28 Differential Inflation Rate

The expected percent difference between the rate of increase assumed for a given item of cost (such as energy), and the general rate of inflation.

2.29 Discounting

A technique for converting future cash flows to equivalent amounts at present or on an agreed prior date.

2.30 Discount Factor

A multiplication number for converting cost and benefits occurring at different times to a common baseline.

2.31 Discount Rate

The rate of interest reflecting the investor's time value of money, used to determine discount factors for converting benefits and costs occurring at different times to a baseline.

2.32 Discount Rate, Nominal

The same as discount rate (*see* **2.31**). In this case, no allowance is made for the changes in the purchasing power of money (such as inflation).

2.33 Discount Rate, Real

The nominal discount rate, after the abjustment for variations in the purchasing power of money discounted payback period (*see* **2.35**).

2.34 Discount Cash Flow

A technique for converting future cash flow to a present value (*see* **2.67** and **2.29**).

2.35 Discounted Payback Period

The time it takes the benefits resulting from an investment to payback the costs involved. A simple payback period does not consider the time value of money.

2.36 Equivalent Annual Cost

The conversion by an interest rate and present worth technique, of all capital and operating costs to a series of equal annual costs. As a system for comparing proposed investments, requires assumption of a specific acceptable interest rate.

2.37 Equivalent Costs

Costs, both present and future, expressed with reference to a common baseline reflecting the time value of money and inflation (*see* **2.67** and **2.8**).

2.38 Equivalent Full Load Hours

Total energy consumption divided by the full-load energy input. This gives the number of hours a piece of equipment would need to operate at its full capacity to consume as much energy as it did operating at various part-loads.

2.39 Escalation

An increase in the cost of equipment, material, or labour due to price level changes.

2.40 Field Costs

All costs normally incurred at the job site.

2.41 Field Overhead Costs

All those costs, other than direct labour and material such as field administration, supervision, tools, etc, involved in completion of a project.

2.42 Financing Costs

The costs of any loan, debt, market borrowing associated with the project, assets, capital or working costs.

2.43 Fixed Costs

The costs, independent of short-term variations in output of the system under consideration. Includes indirect labour, maintenance, technical services, R & D, taxes and insurance, plant overhead, general administrative and selling expenses.

2.44 Future Value, Future Worth

The value of a benefit or a cost at some point in the future, considering the time value of money.

2.45 General and Administrative Expenses

Any mangement, financial or other expense which is incurred by or allocated to that part of an organization which is for the general management and administration of the organization as a whole.

2.46 Inflation

A continuing rise in the general price levels, caused usually by an increase in the volume of money in circulation and credit relative to available goods.

2.47 Initial Costs

All costs associated, with market research, initial development, testing, trials, construction and commissioning of an asset.

2.48 Intangible Capital Asset

An asset which has no physical substance but has a value which is generally the present worth of its future estimated earnings (for example, the cost of training, managerial skills, special talents, etc).

2.49 Internal Rate of Return

The company's or organization's rate of interest that, when used to discount by life span, the costs and benefits of the project, will make the two equal.

2.50 Investment

Capital needed or deployed to create a new asset or a new product or alter an existing one.

2.51 Life, Actual

The period of time an asset is actually used.

2.52 Life Cycle Cost

It covers all the costs from project conception to final scrapping and disposal and includes all costs of operation, repairs, maintenance, energy consumption, rentals, insurance, etc, in addition to the initial costs of development and/or acquisition, all discounted to the same point in time.

2.53 Life Cycle Costing

A comparative assessment of competing design alternatives based on their respective life cycle costs over their economic life.

2.54 Life, Design

The period of life assumed by the designer for a product or project, under his expected levels of use, maintenance, repair and disposal.

2.55 Life, Economic

That period of life over which an investment continues to be the least-cost alternative for meeting a particular objective.

2.56 Maintenance and Repair Cost

The total of labour, material and other related costs incurred in carrying out inspection, preventive maintenance (including replacement) and repair on an asset, and/or on its systems and components.

2.57 Manufacturing Costs

The total of operating costs chargeable to production of the given product. Includes direct expenses such as material, labour, and shop overheads.

2.58 Marginal Costs

The change in total cost caused by varying the output by one unit.

2.59 Merit Points

An evaluation of total performance or quality in numerical terms vis-a-vis all applicable performance criteria, cleary defined and weighted (*see* **2.84**).

2.60 Net Benefits

The difference between the gross benefits and the costs, both discounted to present or annual value rupees.

2.61 Nominal Discount Rate

The rate of interest reflecting the time value of money stemming both from inflation and the real earning power of money over time.

2.62 Non-recurring Cost

Cost that occurs, or is expected to occur only once.

2.63 Operating Cost

A term used in a manufacturing activity or service utility and similar to manufacturing cost used in a production unit.

2.64 Opportunity Cost of Capital

The rate of return possible on the best available investment of comparable risk.

2.65 Overhead

A cost or expense inherent in the performing of an operation, that is engineering construction, operating or manufacturing which cannot be charged to or identified with a specific part of the product, or asset and, therefore, must be allocated on some arbitrary basis believed to be equitable, or handled as a business expense, independent of the volume of production.

2.66 Payback Period

The time it takes the benefits resulting from an investment to payback the cost involved. A simple payback period does not consider the time value of money. A discounted payback period does.

2.67 Present Worth; Preseut Value

The value of a benefit or cost found by discounting future cash flows to the baseline.

2.68 Present Value Factor; Present Worth Factor

The discount factor used to convert future benefits and costs to the present.

2.69 Present Worth Method

A method that requires conversion of all future cash flows to a baseline considering both inflation and opportunity cost of capital. Sometimes also called 'Present Value Method'.

2.70 Project Scope

The defined limits or scope of the project expressed in quality and quantity.

2.71 Rate of Return

A ratio relating to the net profit or cash flow incomes to investments.

2.72 Recurring Costs

Costs that recur on a periodic basis throughout the life of a project.

2.73 Resale Value

The monetary sum expected from the disposal of an asset at the end of its economic life, or at the end of the study period. Also, termed as salvage value or scrap value in certain cases depending upon how the asset may be treated after disposal.

2.74 Salvage Value

See **2.73**.

2.75 Sensitivity Analysis

A technique to assess the effect a change in the input variable(s) has on the resulting out-put. For instance, the effect on the rate of return by assumed changes in inputs such as raw material cost, wages, energy, taxes, duties, natural causes, etc. It is an analysis deliberately carried out to take into account the effects of uncertainties.

2.76 Site Preparation

Preparation of a site for construction activity such as, grading, landscaping, installation of roads and sidings on an area of ground upon which anything previously located had been cleared so as to make the area free of obstructions, entanglements or possible collisions with the positioning or placing of anything new or planned.

2.77 Span, Life

A common measure used to compute LCC for all competing alternatives so as to ensure a common base for valid comparison. It may be expressed in terms of years or output such as km run, or kilowatt hours produced or number of units manufactured.

2.78 Standard Cost

A benchmark cost which is based on pre-established measures that are expected to remain unchanged over an extended period of time. Should be periodically reviewed. Usually fixed for production or construction items or operations.

2.79 Study Period

The length of time over which an investment is analysed (*see* **2.77**).

2.80 Sunk Cost

A cost that has already been incurred and that will not be affected by an investment decision (should not therefore be considered in making a current investment decision).

2.81 Time Value of Money

A name given to the fact that the value of money changes with time. Investment in a project requires that funds either be borrowed (thus incurring an interest charge) or that it be taken from owner resources (thus foregoing potential interest income). Because of these interest costs, the time at which money is required (today, next year, 10 year from now) becomes very important in decision making. It takes into account both the opportunity cost and inflation/deflation.

2.82 Value Analysis

The systematic techniques to analyse an existing item or cost area specifically for functions and then develop alternate ways of performing only the required functions at the lowest cost.

2.83 Value Engineering

A value study undertaken before production or construction commences. In a limited sense, therefore, value engineering means *'Cost Avoidance'* instead of *'Cost Reduction'*.

2.84 Value Index

A ratio of total performance expressed in measurable terms to the LCC (*see* **2.53**) for example so many merit points (*see* **2.59**) per unit of LCC.

2.85 Variable Costs

All those costs direct, indirect, overhead, etc, which may vary for a given level of output.

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